

INTERNATIONAL COOPERATION TREATY

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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
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Date of mailing (day/month/year) 15 August 2000 (15.08.00)	Applicant's or agent's file reference 98 P 2025 P
International application No. PCT/SE99/02083	Priority date (day/month/year) 30 November 1998 (30.11.98)
International filing date (day/month/year) 15 November 1999 (15.11.99)	
Applicant HILL, Rolf	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

09 June 2000 (09.06.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer F. Baechler Telephone No.: (41-22) 338.83.38
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P. ENT COOPERATION TREA

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From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

ST. JUDE MEDICAL AB
Patent Department
S-175 84 Järfälla
SUÈDE

Date of mailing (day/month/year)

14 December 2000 (14.12.00)

Applicant's or agent's file reference

98 P 2025 P

IMPORTANT NOTIFICATION

International application No.

PCT/SE99/02083

International filing date (day/month/year)

15 November 1999 (15.11.99)

1. The following indications appeared on record concerning:

☒

the applicant

☐

the inventor

☐

the agent

☐

the common representative

Name and Address

PACESETTER AB
S-175 84 Järfälla
Sweden

State of Nationality

SE

State of Residence

SE

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐

the person

☒

the name

☐

the address

☐

the nationality

☐

the residence

Name and Address

ST. JUDE MEDICAL AB
S-175 84 Järfälla
Sweden

State of Nationality

SE

State of Residence

SE

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒

the receiving Office

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the designated Offices concerned

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the International Searching Authority

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the elected Offices concerned

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the International Preliminary Examining Authority

☐

other:

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Authorized officer

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PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 98 P 2025 P	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/SE99/02083	International filing date (day/month/year) 15/11/1999	Priority date (day/month/year) 30/11/1998
International Patent Classification (IPC) or national classification and IPC A61N1/375		
Applicant PACESETTER AB et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 09/06/2000	Date of completion of this report 22.09.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Alvazzi Delfrate, S Telephone No. +49 89 2399 7450 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/SE99/02083

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-9 as originally filed

Claims, No.:

1-10 as originally filed

Drawings, sheets:

1/3-3/3 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/SE99/02083

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-10
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-10
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-10
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The invention relates to a connector for connecting leads to a housing for an implantable pacer.

Document **US-A-5 252 090 (=D1)**, which discloses a connector assembly for an implantable stimulating device, is regarded as closest prior art.

Object of the invention is to provide an alternative solution, with respect to the solution provided by **D1**, to the problem of locking a male connector part to the female connector in a pacer system.

To solve said technical problem a locking device as defined in the characterising portion of claim 1 is provided.

The essence of the invention resides in the combination of tongues and a pivot associated with each tongue, each tongue having a first part being located on one side of the pivot and a second part being located on the other side of said pivot.

Document **US-A-4 347 849 (=D2)** relates to a connector system for use with external pacers.

D1 discloses a locking device for a female connector part (Fig.5, ref.5) for cooperation with an elongate, male connector part (Fig.1, ref.7),

- said female connector part comprising a longitudinal bore (Fig.5, ref.36) defining a longitudinal space for said locking device,

- said locking device comprising one or several tongues (Fig.3 and 5, ref.16 and 18) being swingable between two positions,

- a first position in which the tips of the tongues can engage said male elongate connector part (col.10, l.36-41) and a second position in which the tips of the tongues will not engage the male elongate connector part (implicit from col.11, l.15-17),

- said tongues being biased towards said first position by means of a spring force (Fig.3, ref.8).

No pivots associated with tongues are disclosed by **D1**.

D2 comprises longitudinally acting means (Fig.5, ref.62), being provided to act on two plates (ref.58 and 60), which engage the male elongate connector part with two

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/SE99/02083

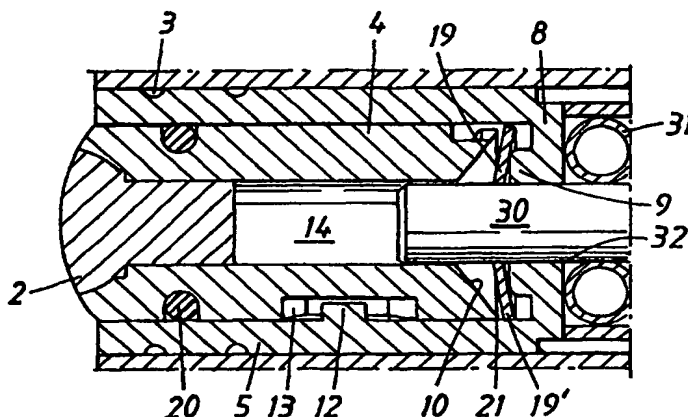
apertures (ref.59 and 61), and not with the tips of tongues, as required by claim 1.

The locking device disclosed by **D2** is therefore completely different from the device of the present invention.

The other available prior art documents do not give hint toward a locking device as defined in claim 1.

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : A61N 1/375, H01R 4/48 // 4/26	A1	(11) International Publication Number: WO 00/32268 (43) International Publication Date: 8 June 2000 (08.06.00)
(21) International Application Number: PCT/SE99/02083 (22) International Filing Date: 15 November 1999 (15.11.99) (30) Priority Data: 9804138-7 30 November 1998 (30.11.98) SE (71) Applicant (for all designated States except US): PACESETTER AB [SE/SE]; S-175 84 Järfälla (SE). (72) Inventor; and (75) Inventor/Applicant (for US only): HILL, Rolf [SE/SE]; Gösvägen 8, S-175 55 Järfälla (SE). (74) Common Representative: PACESETTER AB; Patent Department, S-175 84 Järfälla (SE).		(81) Designated States: US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: DEVICE IN CONNECTION WITH PACERS**(57) Abstract**

The invention relates to a locking device (1) for a female connector part for cooperation with an elongate, male connector part (30), said female connector part being intended for use in a pacer housing. Said female connector part comprises a longitudinal bore defining a longitudinal space for said locking device. Said locking device comprises one or several tongues (19, 19') being swingable between two positions, a first position in which the tips of the tongues (19, 19') can engage said male elongate connector part (30) and a second position in which the tips of the tongues (19, 19') will not engage the male elongate connector part (30). Said tongues are biased towards said first position by means of a spring force. A pivot (9) is associated with each tongue and each tongue has a first part engaging said connector means (30) and being located on one side of said pivot and a second part being located on the other side of said pivot. Longitudinally acting means (4) are provided to act on said second part of said tongues (19, 19') for actuating said tongues from said first position against said bias to said second position.

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Device in connection with pacersField of the invention.

5 The present invention relates to a connector for connecting leads to a housing for an implantable pacer according to the preamble of claim 1.

Background of the invention.

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A pacer system normally comprises a pulse generator located in a pacer housing, leads and electrodes at the distal end of the leads. The proximal end of the leads is connected to the pacer housing by means of a releasable connector. The

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connector comprises a female connector part in the pacer housing. The proximal end of the lead normally is designed as a standardized male connector part and the female connector part normally is standardized to such an extent that it will receive this standardized male connector part.

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The most common way of fixing or locking the male connector part in the female connector part is to use set screws which are oriented in an orthogonal direction in relation to the male connector part and which are accessible from the outside of the pacer housing. The female connector part

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normally is located in a header molded on to the housing.

Whilst these set screws generally have a good fixing effect, the screws are somewhat difficult to handle, the screws being small. For this reason, attempts have been made to

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develop fixing means, which more or less automatically lock the male connector part upon insertion thereof.

One such device is for instance disclosed in US A 5,252,090. This device includes two elastically resilient metal tongues

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in a female connector part. The tongues are situated in a common plane and have a common central line, with a respective free end, which are located oppositely to each other. The distance between the two free ends is smaller

than the diameter of the male connector part. The tongues will be deflected into the direction of insertion when the male connector part is inserted into the female connector part and the tongues thus will engage and lock the sides of the male connector part. If the male connector part is pulled outwardly from the female connector part, the locking effect will increase. The reason is that the friction between the tongues and the male connector part will draw the tongues in closer contact with the male connector part. The two tongues are integrally connected to two wings extending through openings in the header. The wings are angled in relation to the plane of the tongues. Pressure on the wings will move the tongues out of engagement with the male connector part, which then can be removed.

In similarity with the design using set-screws, the locking means in the above design have to be accessed laterally from the outside. For this reason, the locking means are located in the header in order to avoid openings for manipulation in the parts of the housing in which the electronic parts of the pacemaker are located. Any openings for the connections in the housing or can into the interior of the housing from the header can be permanently sealed.

Another design of a device for locking the terminal pin of a male connector plug is disclosed in US-A-4,784,141. This device is designed for location in one open end of a bore through a header or through the pacemaker and is accessible from that end. The male plug is to be inserted through the opposite end of the bore. The locking device comprises a hollow cylindrical part with interior threads and an interior, end flange with a conical interior surface. The locking device further comprises a plug with a central bore and with external threads fitting the interior threads in the cylindrical part. The inner open end of the plug is also provided with a conical surface. A resilient locking ring with conically shaped sides is located between the respective conical surface on the plug and on the

cylindrical part. When the plug is screwed inwardly into the cylindrical part, the conical surfaces on plug and cylindrical part will compress the locking ring inwardly against a connector pin inserted into the locking part. In
5 this way the pin is locked in the locking device.

The primary object of the invention is to provide a connector locking part of the kind described above, which can be used with standard male connector parts, which
10 involves a positive locking effect and which does not need any lateral openings in the connector housing or the pacemaker housing. At the same time, it should be possible to easily remove the male connector part without any need of manual operations involving special tools. The object
15 further is to provide a connector that is suitable for use in so called black holes. Black holes are connectors made directly in the pacer housing without any need for the commonly used molded-on connector parts in the form of headers. A further object is to provide a connector that
20 will indicate visually when the male connector plug has been inserted correctly.

Short description of the inventive concept

25 The primary object is achieved in that a connector according to the preamble of the appended claim 1 is provided with the features set forth in the characterizing part of claim 1.

Preferred embodiments are set forth in the dependent claims.

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Short description of the appended drawings.

Figs 1 - 1a illustrate the component parts of a locking device for a female connector part in accordance with the
35 invention,

Fig 2 shows the component parts in Fig 1 in an assembled state in a section,

Fig 3 illustrates the locking device just before the insertion of a male connector pin,

5 Fig 4 illustrates a first locking state indicating a correct engagement,

Fig 5 illustrates a second locking state,

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Fig 6 illustrates the opening of the locking device.

Detailed description of a preferred embodiment of the invention

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In the description below, "longitudinal" relates to the longitudinal direction of the female connector part and "outer end" relates to the end of the locking device accessible from the outside. It should also be noted that
20 all reference signs are not repeated throughout all drawings.

The component parts of a locking part 1 for a female connector according to a preferred embodiment are shown in
25 an exploded view in Fig 1. The locking part comprises a hollow cylindrical part 5 with an end wall 8 in which a central opening 15 is located. The opening 15 is dimensioned to receive the contact pin of a standard male connector. The outside of the cylindrical part is provided with
30 circumferential grooves 3 serving as space for excess glue when the cylindrical part is glued into a female connector part.

The locking device further comprises a locking washer 7 with
35 a central opening 18. Two locking tongues 19, 19' are located on opposite sides of the opening 18 and extend into the opening. The distance between the tips is less than the diameter of the male connector pin to be locked into the

locking device. The washer 7 has an outer shape that includes two parallel sides 17, 17'. The two parallel sides will bias the tongues towards the common plane of the washer. It should be noted that in this particular embodiment the sides have been designed to be parallel in order to define the bending force of the sides of the washer. The design may also be used for locking the washer against rotation, as will be described below in connection with an alternative embodiment.

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The inside of the inner end wall is provided with a flange 9 around the opening 15. The flange has been placed in such a way that there will be a distance between the flange and the inner surface of the wall of the cylindrical part 5. The edge 11 of the flange facing the inside of the wall of the cylindrical part 5 is rounded. The flange 9 will serve as a pivot for the tongues.

The locking device further comprises a cylindrical plunger 4 fitting into the cylindrical part 5. The plunger is provided with a central bore 14 and the outside of the plunger is provided with a spiraling groove 6 intersecting a longitudinal groove 13. These grooves are intended to cooperate with an interior lug 12 located on the inside wall of the cylindrical part 5. The outer side of the outer end of the plunger 4 is provided with a peripheral groove 16 intended to sealingly hold an O-ring 20 against the inside of the cylindrical part 5. As seen in Fig 1a, a part 6' of the spiraling groove 6 passes beyond the intersection with the groove 13.

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The inside of the inner end of the plunger 4 is provided with a conical surface 10, the wall of the plunger 4 thus tapering into a peripheral edge 21.

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The outer end of the longitudinal bore of the plunger 4 is closed by means of a plug 2. The opening in the bore is

enlarged by means of a slit permitting the insertion of a screwdriver or an equivalent tool.

5 In the assembled state, illustrated in Figs 2 - 6, the plunger 4 will keep the washer 7 in the vicinity of the flange 9. The plunger will be held in the cylindrical part 5 by means of the longitudinal slot 13, which permits a limited longitudinal movement.

10 The locking device is simple to assemble. The procedure only comprises the steps of:

- placing the washer 7 in the cylindrical part 5,
- mounting the sealing ring 20 in the groove 16 on the
- 15 plunger 4,
- engaging the lug 12 in the slot 6 and turning the plunger until the lug 12 is located in the longitudinal slot 13.

20 The locking device 1 can be glued, welded or otherwise bonded into a tubular connector. The device of course also can be molded into a header.

A male connector pin 30 to be locked into the locking device 1 is inserted through the opening 15 in the end wall 8 as
25 illustrated in Fig 3. As seen in Fig 4, the plunger 4 in this particular embodiment can move outwards together with the washer 7 when the pin 30 engages the washer 7. The outward movement is limited by the lug 12 engaging the inner end of the slot 13. In the case in which the locking device
30 is located in a through hole flush with the outer surface of the pacer in which it is to be mounted, the outward movement will be an indication that the male connector pin 30 has been correctly inserted, see Fig 4.

35 Since the distance between the tips of the two tongues 19, 19' is less than the diameter of the pin 30, the tongues will be bent in the direction of insertion and consequently form an angle with the surface of the pin. The spring bias

of the two parallel sides of the washer will urge the tongues into contact with the pin. The length and the stiffness of the tongues is such that the tongues in principle cannot swing past the plane of the washer, The pin
5 therefore will be locked behind the end wall 8 against withdrawal from the connector.

When the pin has been fully inserted, the plunger 4 can be pushed back into the cylindrical part 5 so as to be flush
10 with the outside of the housing as indicated in Fig 5.

If the pin is to be disconnected, the plunger 4 is pushed inwardly, the inner peripheral edge 21 engaging the peripheral ends of the washer 7 as illustrated in Fig 6. As
15 a consequence, the tongues 19, 19' will swing around the flange and release the pin. The pin with lead then easily can be withdrawn.

The removal of the male pin 30 from the connector can be facilitated by removing the plug 2 from the plunger and
20 screwing the plunger into the cylindrical part 5 by means of the groove 6'. The plunger 4 thus will deflect the tongues 19, 19' from the pin. The pitch of the groove is chosen such that the plunger 4 will remain in the rotational position of
25 the screwed-in state in spite of the outward force exerted by the deformed washer 7. The pin then can be pushed out from the connector by means of a suitable tool that can be inserted through the opening of the bore 14.

30 It should be noted that, in the above embodiment, the washer is not locked against rotation. If however the washer is locked against rotation, it will be possible to locate the tongues (excluding the remaining parts of the washer) on a stud each instead on a circular flange. The studs also will
35 serve as pivots for the tongues. In this case the force needed to swing the tongues out of engagements with the pin would be less, given that the dimensions of the washer remains the same (the spring bias of the tongues into

engagement with the pin would however not be affected). In this embodiment the studs are located opposite each other adjacent the central opening 15. The inner side of the wall of the cylindrical part adjacent the studs is shaped to conform to the outer peripheral shape of the washer 7, thus also having two parallel sides in cross-section. The parallel sides are parallel to a center-line drawn through the two studs. In this way, the washer will be locked against rotation when the washer is located on the studs.

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In this particular embodiment the inner part of the outside of the plunger would have to have a shape corresponding to the inner shape of the cylindrical part 5. Although the plunger still could be mounted in the cylindrical part by means of a spiraling groove, the option of opening the locking device by rotating the plunger discussed in connection with the above embodiment would be excluded. If this option also were desirable, the means for locking the washer against rotation would have to be located within the outer periphery of the washer and extend past the washer. The inside of the plunger would have to be hollowed to accommodate these means in order to allow the free rotation of the plunger to its innermost location.

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The electrical connections from the female connector to the pulse generator are not a part of the present invention and thus are not shown in detail. The connections may for instance be made through circular springs 31 engaging the contact surfaces 32 on the male connector 30, as for instance indicated in Fig 5. These rings are in turn connected to the interior of the pacer.

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The cylindrical part 5 and the plunger 4 may be made of any suitable biocompatible material used in pacers, as for instance metals such as titanium, stainless steel, NP-35 alloy, or ceramics such as Al_2O_3 or of plastics such as macrolon, epoxy resin etc. The two parts may be made of the same material or of different materials. The tongues and

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washer preferably is made of titanium, stainless steel or NP-35, but other biocompatible materials having a comparable resilience may of course be used.

5 The invention of course can be varied in many ways within the scope of the appended claims. In the above embodiments, the washer has been described as having two tongues. It is however quite possible to use only one tongue or more than two tongues. The tongues have been illustrated as being part
10 of a resilient washer, but they may of course be associated with separate springs for instance formed integrally with said tongues. The cylindrical part has been illustrated as a separate part, but may of course be an integral part of a pacemaker housing or header. In the widest sense, the plunger
15 may be any device transferring a pushing force for the exterior of the pacemaker to the peripheral parts of the washer.

The male connector part has been illustrated above as being a standard IS-1 male connector with a complementary female
20 connector. The male connector part of course could be of any kind having an elongate shape, the female connector part having a corresponding complementary shape.

Claims

1. Locking device (1) for a female connector part for cooperation with an elongate, male connector part (30), said female connector part being intended for use in a pacer housing, said female connector part comprising a longitudinal bore defining a longitudinal space for said locking device, said locking device comprising one or several tongues (19, 19'), said tongues (19, 19') being swingable between two positions, a first position in which the tips of the tongues (19, 19') can engage said male elongate connector part (30) and a second position in which the tips of the tongues (19, 19') will not engage the male elongate connector part (30), said tongues being biased towards said first position by means of a spring force, **characterized** in that a pivot (9) is associated with each tongue, each tongue having a first part being located on one side of said pivot and engaging said connector means (30), a second part being located on the other side of said pivot, longitudinally acting means (4) being provided to act on said second part of said tongues for actuating said tongues (19, 19') from said first position against said bias to said second position.
- 25 2. Locking device according to claim 1, **characterized** in that said locking means (1) comprises a hollow cylindrical part (5) with an end wall (8) having a central opening (15).
- 30 3. Locking device according to claim 2, **characterized** in that said pivot (9) is located inside said opening (15) adjacent said opening (15).
4. Locking device according to claim 3, **characterized** in that said pivot is in the form of a flange surrounding said opening (15).
- 35 5. Locking device according to claim 3, **characterized** in that said pivots (9) are in the form of a stud for each

tongue, said studs located adjacent said opening on the inner side of said wall (8).

6. Locking device according to anyone of the preceding
5 claims, **characterized** in that said tongues (19, 19') are formed integrally with a washer (7) with a central opening (18), said tongues extending into said opening (18) so as to define a distance that is smaller than the diameter of the male connector part to be locked in the locking device.

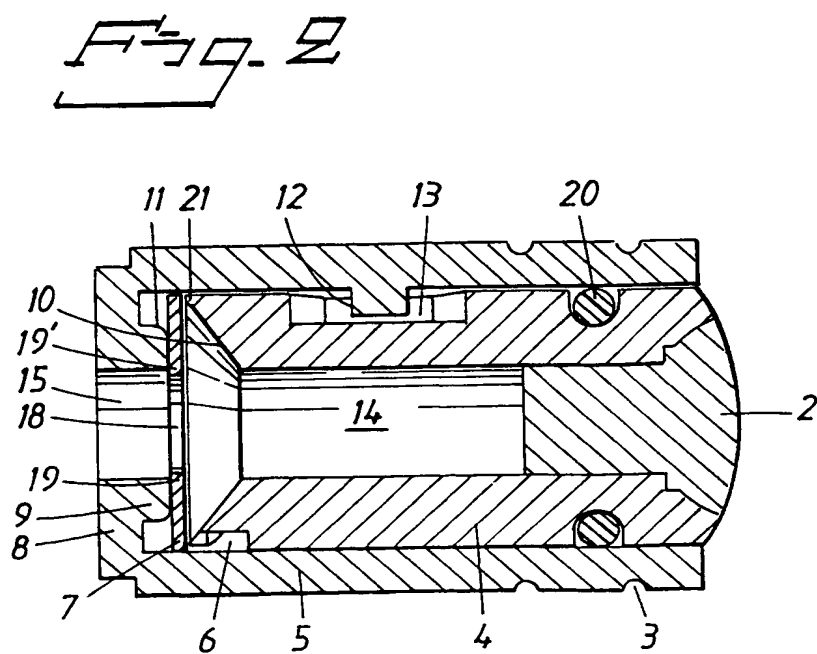
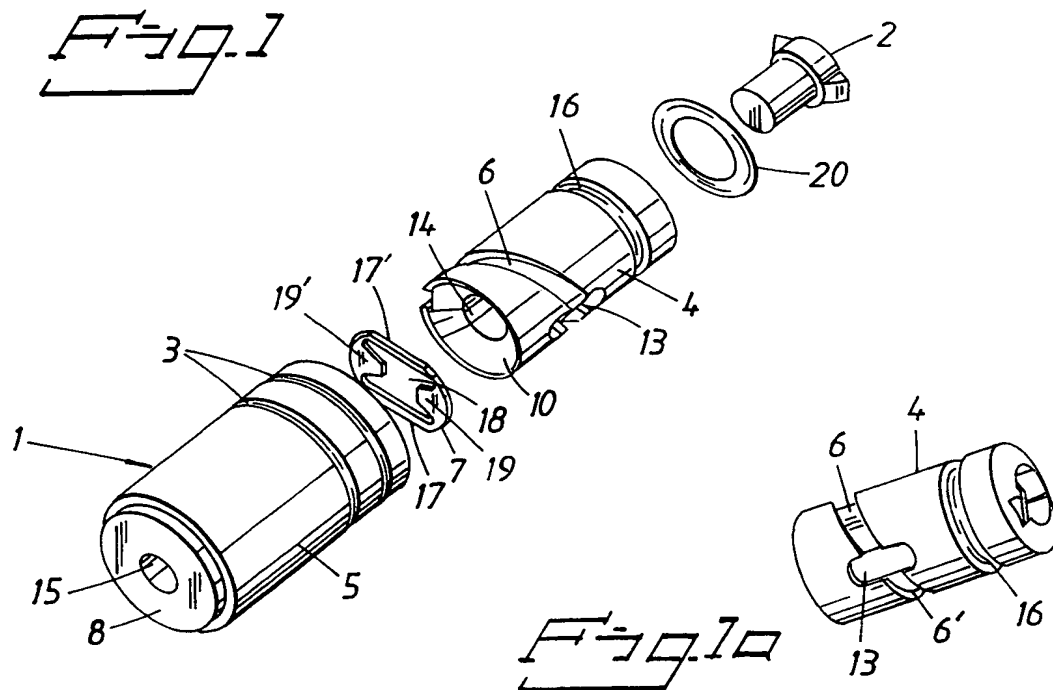
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7. Locking device according to claim 6, **characterized** in that two tongues (19, 19') are provided, said tongues being located opposite to each other.

15 8. Locking device according to claim 6, **characterized** in that three or more tongues (19, 19') are provided, said tongues being located symmetrically around the circumference of said washer.

20 9. Locking device according to anyone of the preceding claims, **characterized** in that said longitudinally acting device is a plunger (4) with a central bore (14), said plunger being slidable in said cylindrical part (5), said tongues (19, 19') being located between said end wall (8)
25 and said plunger (4) and being seatable on said pivots.

10. Locking device according to claim 9, **characterized** in that said plunger is provided with a peripheral edge (21) acting on the peripheral part of said tongues.



2 / 3

Fig. 3

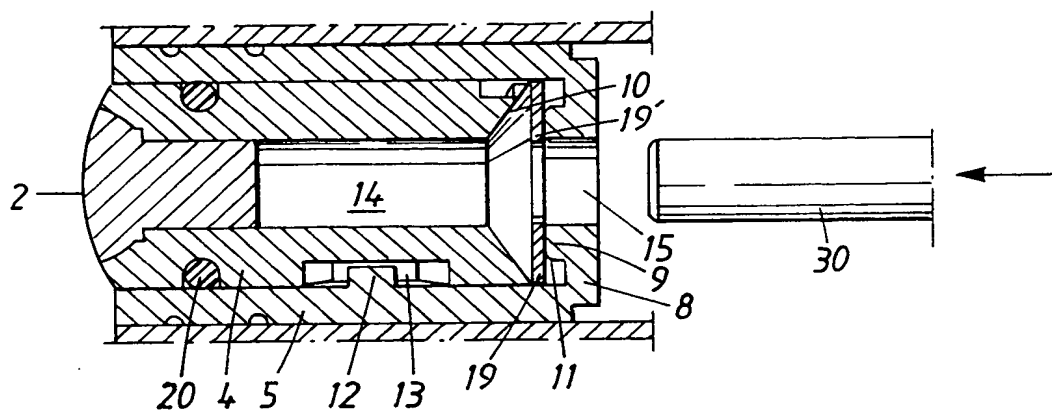
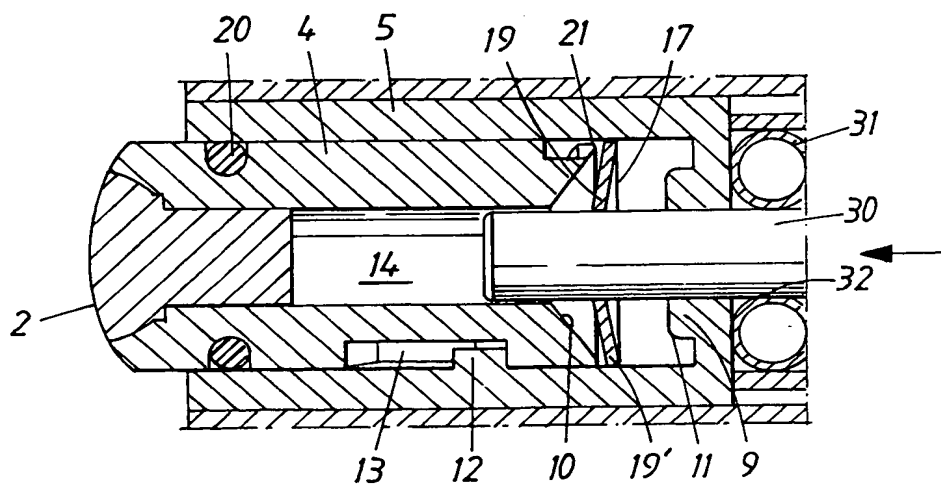


Fig. 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/02083

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A61N 1/375, H01R 4/48 // H01R 004/26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A61N, H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4347849 A (G.L. CONGDON), 7 Sept 1982 (07.09.82), column 3, line 29 - column 4, line 35, figures 2-6, abstract	1
Y	--	2-8
Y	US 5489225 A (C.A. JULIAN), 6 February 1996 (06.02.96), column 4, line 26 - column 5, line 5; column 5, line 41 - column 6, line 10; column 6, line 44 - line 55, figures 2-5, abstract	2-5
D,Y	US 5252090 A (J.F. GIURTINO ET AL), 12 October 1993 (12.10.93), column 6, line 8 - column 7, line 17, figures 5,6,8-10, abstract	6-8
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Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

17 March 2000

Date of mailing of the international search report

03-04-2000

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/02083

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0786269 A1 (PACESETTER AB), 30 July 1997 (30.07.97), figures 1-5, abstract -- -----	1-10

INTERNATIONAL SEARCH REPORT
Information on patent family members

02/12/99

International application No.
PCT/SE 99/02083

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
US	4347849	A	07/09/82	NONE		
US	5489225	A	06/02/96	NONE		
US	5252090	A	12/10/93	EP	0590756 A	06/04/94
EP	0786269	A1	30/07/97	AU	5018196 A	02/10/96
				EP	0819302 A	21/01/98
				JP	9206385 A	12/08/97
				SE	9600311 D	00/00/00
				US	5807144 A	15/09/98